

Claim Amendments

1. (currently amended) A photonic component package, the package such that:

the package couples for coupling to at least two photonic elements;

the package is mounted and for mounting onto a module; and

the package comprises comprising:

a package body with a through hole and;

and at least two pins, the at least two pins for insertion into the module, wherein
the at least two pins each comprise a substantially straight section, and the at least
two pins extend from the package body without increasing the footprint
requirements of the package for mounting the package onto the module; and

the package body having a photonic inlet on one side of the through hole, the
photonic inlet oriented parallel to a mounting surface of the module and aligned
with the through hole, and the photonic inlet for attaching to at least one photonic
element; and

a lid, the lid attached to the package body on the side of the through hole opposite
to that having the photonic inlet.
2. (currently amended) The photonic component package of claim 1, wherein the package
further comprises an interior, the interior for housing a semiconductor die, the
semiconductor die such that comprising:

the semiconductor die has two sides:

a planar side with at least two electrical contact pads for electrical connection to
the at least two pins; and

a die photonic element side having a die photonic element, the die photonic
element side opposite to the planar side; and

whereby the semiconductor die is attached to the package in such a way that:

~~and a~~ the photonic element ~~planar~~ side of the die is positioned approximately orthogonal to the photonic inlet, on the opposite side of the through hole from the photonic inlet, and facing the through hole;

~~and wherein~~ the die photonic element is optically coupled with the at least one photonic element attached to the photonic inlet on the side of the through hole opposite to that to which the semiconductor die is attached; and

electrical connection to the electrical contact pads is on the planar side of the die, this planar side of the die facing away from the through hole and photonic inlet.

3. (original) The photonic component package of claim 2, wherein the package body further comprises a pinout side, wherein the straight sections of the at least two pins are positioned substantially orthogonally from the pinout side.
4. (currently amended) The photonic component package of claim 2, wherein the photonic element is ~~selected from the group consisting of a wave guide, a planar wave guide, a photonic crystal wave guide, a diffraction wave guide grating, an optical fiber, a collimator, a dual fiber collimator, a multi fiber collimator, a lens, a diffractive lens, an optical lens, a spherical lens, an aspherical lens, a ball lens, a GRIN lens, a C lens, a lens system, a mirror, a MEMS-based movable micro-mirror~~ with its reflective surface on the side opposite to that containing electrical contact pads for wire-bonding, a flat mirror, a shaped mirror, a diffractive mirror, a grating plate or plates, a laser, a modulator, a photodiode, a VCSEL, and a prism.
5. (original) The photonic component package of claim 2, wherein the body comprises ceramic.
6. (original) The photonic component package of claim 2, wherein the body comprises metal.

7. (original) The photonic component package of claim 2, wherein the at least two pins are oriented to fit into a socket.
8. (original) The photonic component package of claim 2, wherein the photonic component package is a low cost package.
9. (cancelled)
10. (cancelled) The photonic component package of claim 2, wherein the photonic component package further comprises a lid, and the package interior further comprises a cavity, and the lid coupled with the package body and substantially covering the cavity, whereby the semiconductor die is housed within a combination of the cavity and the lid.
11. (cancelled)
12. (currently amended) The photonic component ~~device~~ package of claim 2, wherein the photonic element semiconductor die comprises a photodiode with its photosensitive area on the side opposite to that containing electrical contact pads for wire-bonding.
13. (currently amended) The photonic component package of claim 2, wherein the photonic element is a VCSEL with its emitting surface on the side opposite to that containing electrical contact pads for wire bonding. ~~semiconductor die is comprised within a MEMS device.~~
14. (cancelled)
15. (cancelled)
16. (currently amended) The photonic component package of claim 13 ~~15~~, wherein the photonic component package is further coupled with a receiving photonic element, the

receiving photonic element coupled with the photonic inlet and for receiving light from the semiconductor die and via the through hole.

17. (original) The photonic component package of claim 16, wherein the receiving photonic element is selected from the group consisting of a wave guide, a planar wave guide, a photonic crystal wave guide, a diffraction wave guide grating, an optical fiber, a collimator, a dual fiber collimator, a multi-fiber collimator, a lens, a diffractive lens, an optical lens, a spherical lens, an aspherical lens, a ball lens, a GRIN lens, a C-lens, a lens system, a mirror, a MEMS-based movable micro-mirror, a flat mirror, a shaped mirror, a diffractive mirror, a grating plate or plates, a modulator, a photodiode, and a prism.
18. (currently amended) The photonic component package of claim 2~~13~~, wherein the body comprises ceramic.
19. (currently amended) The photonic component package of claim 2~~13~~, wherein the body comprises metal
20. (currently amended) The photonic component package of claim 4~~14~~, wherein the mirror is movable in response to electrical signals applied to the MEMS device via at least one of the at least two pins, whereby the angle of reflection of the light from the MEMS is affected.
21. (cancelled)
22. (cancelled)
23. (cancelled)
24. (currently amended) The photonic component package of claim 2~~21~~, wherein the photonic component package further comprises at least three pins coupled to and

extending from the pinout side and the at least three pins are electrically coupled with the semiconductor die.

25. (cancelled)

26. (cancelled)

27. (cancelled)

28. (cancelled)

29. (cancelled)

30. (cancelled)

31. (cancelled)

32. (cancelled)

33. (cancelled)

34. (cancelled)

35. (cancelled)

36. (cancelled)

37. (cancelled)

38. (cancelled)

39. (cancelled)

40. (cancelled)

41. (cancelled)

42. (original) A VOA package, the VOA package for attachment to a mounting surface of a module, and the VOA package for enclosing a semiconductor die, the semiconductor die comprising or coupled with a movable mirror, and the semiconductor die having two planar sides, at least two electrical contact pads on the side of the die opposite to that having the movable mirror, and the semiconductor die further comprises or is coupled with the movable mirror, and the VOA package coupled with a collimator, the collimator for positioning at least two optical fibers, the VOA package comprising:

a package body, a lid, a photonic inlet, and at least two pins;

the package body having a pinout side, a photonic inlet side and a cavity;

the photonic inlet attached to the photonic inlet side of the package, and the photonic inlet for attaching the collimator and positioning the optical fibers to be parallel to the mounting surface of the module;

the through hole extending through the VOA package and to the cavity, and the through hole for enabling light to pass between the movable mirror and the at least two optical fibers;

each of the at least two pins coupled with the pinout side and electrically coupled with the semiconductor die on the side of the die opposite to that having the movable mirror, and the at least two pins extending from the pinout side;

the lid coupled with the body and enclosing the cavity; and

whereby the semiconductor die is attached to the body and within the cavity, and the mirror of the semiconductor die is positioned to variably optically attenuate an optical

signal emitted from at least one of the at least two optical fibers through a collimator lens by controllably redirecting the optical signal reflected from the mirror back through the through hole and going back through the collimator lens to the other optical fiber.

43. (cancelled)

44. (cancelled)

45. (original) The photonic component package of claim 43, wherein the photonic component package further comprises at least three pins coupled to and extending from the pinout side and the at least three pins electrically coupled with the semiconductor die.

46. (original) The VOA package of claim 42, wherein the body comprises ceramic.

47. (original) The VOA package of claim 42, wherein the body comprises metal

48. (original) The VOA package of claim 42, wherein the semiconductor die is comprised within a MEMS device.

49. (original) The photonic component package of claim 1, wherein the package further comprises a boot, the boot for at least partially enclosing the photonic inlet, the boot comprising:

a base, an upper wall, a boot opening, and a boot hole, wherein the boot opening enables at least partial insertion of the photonic element into the boot, and light may pass between the photonic element and the semiconductor die and through the boot hole;

the base is substantially planar and is positioned to make mechanical contact with a surface of a module when the photonic component package is mechanically coupled with the module; and

the upper wall is coupled with the base, and the upper wall and base in combination house the photonic inlet.

50. (original) The photonic component package of claim 49, wherein the upper wall of the boot further comprises three substantially planar surfaces, wherein a first substantially planar surface is substantially parallel with the base, and a second and a third substantially planar surfaces are both substantially perpendicular to the base.

51. (original) A method of packaging a photonic component, comprising:

providing an external photonic element;

providing a semiconductor die, the semiconductor die having a planar side, at least two electrical contact pads, and a die photonic element;

providing a package, the package having a package body, at least two pins, a lid, a through hole, and a photonic inlet;

the package body having a pinout side and a cavity;

the at least two pins extending from the pinout side of the package body, and wherein the projections of the at least two pins onto the pinout side are fully contained within the footprint of the package body;

the lid for attachment to the package body and for enclosing the cavity;

the through hole for providing a pathway for light through the package and between the external photonic element and the die photonic element;

the photonic inlet oriented parallel to a mounting surface of a module, and the photonic inlet for aligning and attaching the external photonic element;

attaching the semiconductor die to the package body and within the cavity, and in an orientation wherein the planar side of the semiconductor die is approximately orthogonal to the photonic inlet;

bonding of at least one wire to at least one pin and to one of the at least two electrical contact pads;

attaching the lid to the package body and enclosing the cavity;

aligning the external photonic element relative to the through hole and the die photonic element to optically couple the external photonic element and the die photonic element; and

attaching the external photonic element to the photonic inlet in a optically coupled alignment, whereby the semiconductor die is positioned approximately orthogonal to the external photonic element, and the die photonic element and the external photonic element are optically coupled via the through hole.

52. (cancelled)

53. (original) The method of claim 51, wherein standard die attach equipment attaches the semiconductor die to the package body.

54. (original) The method of claim 51, wherein the wire bonds are formed using standard wire bond equipment.

55. (original) The method of claim 51, wherein the package is assembled with standard packaging equipment.

56. (original) The method of claim 51, wherein the lid is attached to the body package with standard lid attachment equipment.

57. (original) The method of claim 51, wherein the package is marked with standard semiconductor device marking equipment.

58. (original) The method of claim 51, wherein the photonic component is tested using standard test equipment.

59. (original) The method of claim 51, further comprising providing a module and mounting the device onto the module using standard mounting equipment.
60. (original) The method of claim 51, wherein the package substantially complies with a suitable package standard known in the art.